DOCUMENT RESUME

ED 276 251 FL 016 200

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TITLE Nondescriptionality and Natural Kind Terms.
PUB DATE Sep 86
NOTE 12p.; Revised version of a paper presented at the Annual Kentucky Foreign Language Conference (April 1986).
PUB TYPE Information Analyses (070) -- Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Concept Formation; *Epistemology; Language Processing; *Language Research; *Linguistic Theory; *Semantics
IDENTIFIERS *Nature

ABSTRACT

English, and presumably any natural language, contains a small group of expressions referring to species of things found in nature. These species are defined by their internal structure, determined by genetics in the case of living things and by chemical or physical properties in the case of others. The reference of these terms is determined by these properties, but the properties are not semantically associated with the terms in question because the terms were introduced before science discovered the internal structure properties. Therefore, some of the terms are nondescriptional. Two theorists, Kripke and Putnam, have shown that in the case of this group of natural kind terms, humans let the natural essence or properties function as Locke's nominal essence, or sense. This is supported by evidence from a study of language use in ten-year-olds. However, this class of terms is smaller than was previously thought, and some questions about it remain, including the function of nondescriptional terms within the language, possible grammatical correlates of nondescriptionality, the relationship between descriptionality and decompositionality, and learnability. (MSE)

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Barbara Abbott
Mich. St. U.
September 1986

Nondescriptionality and Natural Kind Terms[1]

We have Frege to thank for what might have been called until recently the 'standard' picture of how the semantics of expressions works. Frege distinguished the reference (or denotation, or (in modern terminology) the *extension*) of an expression from its sense (or meaning, in some sense of 'meaning'). The former is whatever object or set of objects the expression picks out in the world. About the latter Frege didn't say much. One thing he did say was that the sense of an expression is the 'mode of presentation' of the referent. We can take a sense to be a property or group of properties semantically associated with an expression, in virtue of possession of which, objects fall into the extension of the expression. This picture works best with definite descriptions. The phrase *the inventor of bifocals* has as its extension the person Benjamin Franklin. Its sense is the property of having invented bifocals, which property Benjamin Franklin happens to have, which is why the phrase refers to him. Frege's picture also works well for some single words, like *bachelor*. Its extension is the set of bachelors (a group of people). Its sense is the property of being an adult human male who has never married, in virtue of possession of which property, people belong to the extension of the word.

In *Naming and necessity* Kripke argued extremely persuasively that proper names such as *Marie Curie, Benjamin Franklin*, etc., display a different sort of semantic behavior. He argued that such expressions do not have a Fregean sense of the kind described above. That is, they do not denote whatever they denote in virtue of any properties associated with the names and possessed by the referents (but rather, simply because the individuals in question have been so dubbed, and the name has been passed down histori-cally as a name of that individual). Thus proper names are *nondescriptional*, to use a term introduced by Salmon (1981). An apparently closely related property possessed by proper names is rigid designation. A singular term is a rigid designator if it denotes, or has as its extension, the same

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[1]This paper (minus a few revisions) was delivered at the Kentucky Foreign Language Conference in April 1986. An earlier version was also given at the Michigan Linguistic Society meeting in October 1985. In both cases the background of the audience was not known to me ahead of time, and so I tried to presuppose no knowledge of semantics. I apologize to the reader who feels insulted.

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entity in all possible worlds. In being rigid designators proper names are again distinguished from other kinds of expressions. Compare the name *Benjamin Franklin* with the description *the inventor of bifocals*. The reference of the latter will vary from possible world to possible world depending on the facts--specifically who it is, in each world, who invents bifocals. In the possible state of affairs in which Thomas Jefferson invented bifocals, the extension of the phrase *the inventor of bifocals* will be Thomas Jefferson. The name *Benjamin Franklin*, on the other hand, denotes Benjamin Franklin in all possible worlds.[2]

Kripke did not make a sharp distinction, in *Naming and Necessity*, between these two properties of proper names--non-descriptionality and rigid designation. One way to see that they are distinct is to observe examples of descriptional terms which are nevertheless rigid designators. An example is *the sum of two and five*. This expression denotes seven in all possible worlds. It does so, however, in virtue of seven's possessing the property of being what you get when you add two and five. (There may also be examples of singular terms which are nondescriptional flaccid designators, but discussion of such would take us too far afield here.)

In making the kinds of observations sketched above, Kripke was apparently drawing on intuitions about proper names which are held quite commonly. (Indeed, as he noted, J.S. Mill had made similar observations over a hundred years earlier.) In the latter part of his essay, however, he made some more radical suggestions. Specifically, he argued that the conclusions he had reached concerning proper names held also, somewhat modified, for common nouns for certain natural kinds and naturally occurring phenomena-words, that is, such as *tiger*, *water*, *gold*, *heat*, and *light*; and in passing remarks he suggested that they might also apply to adjectives such as

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[2]In possible worlds semantics, the *intension* of an expression is a function from possible worlds to extensions. The intension of an ordinary definite description will be a function whose value varies from world to world. The intension of a rigid designator, on the other hand, will be a constant function--a function yielding the same value no matter which possible world is taken as argument. Intensions are the analysis, within a possible worlds framework, of the Fregean concept of 'sense'. One has to be careful here however. It is natural to say, if you agree with Kripke about the semantics of proper names, that proper names don't have a Fregean sense--meaning that they don't have associated with them some property or properties which determine their denotations. They will, however, have an intension in a possible worlds semantics. It's just that their intension will be a constant function, rather than one of the more usual 'variable-valued' functions.

hot, *loud*, and *red* (134). (For the time being I will refer to all such words simply as natural kind terms, or NKTs.)

Kripke put forward two major claims about natural kind terms. One is that the necessary and sufficient conditions for something's falling in the extension of such a term is determined by what we might (following common usage) loosely call its 'internal structure'. For example, to be a tiger something must have the same genetic makeup that tigers have. Appearances don't matter--a large animal with cat-like appearance, and tiger-type stripes and appetites, is not a tiger if it doesn't have the right insides; and conversely, a three-legged, stripeless, vegetarian beast is a (funny-looking) tiger if it has the right genetic makeup. To be gold, you have to be a substance with the right atomic structure (atomic number 79 (I think)). Heat is molecular motion and only that. Something which causes the same sensation in us (perhaps in another possible world), but is not molecular motion, is not heat. For brevity I will call this Kripke's <u>metaphysical claim</u>.

The other claim is that, despite the fact that these internal structure properties determine the reference of NKTs, they nevertheless do not constitute, or form a part of, the <u>meaning</u> of such terms. Thus Kripke held that these terms, like proper names, lack a Fregean sense in the sense described above. Kripke reached this conclusion by considering, not alternative (metaphysically) possible worlds, but instead what we might find out to be true about <u>this</u> world. Current science might be wrong. It might turn out that tigers are actually an unusual type of reptile, or cleverly constructed mechanical devices sent here from outer space. We would describe such circumstances, Kripke held, as I just have rather than saying "Tigers don't exist". Similarly were gold found not to be an element at all but some kind of compound substance, it would still be gold, and we would simply conclude that gold was not as we had thought it was. It's crucial, too, that we would continue in our established usage under these circumstances without any felt change in the meaning of these terms, just as there was no change in meaning felt when scientists discovered (what we now believe to be) the 'internal structure' of tigers, water, gold, and heat. This second claim might be called Kripke's <u>epistemic claim</u>.[3]

Kripke called these natural kind terms rigid designators, as have many writers on the topic since. However, as has

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[3]Contrast the word *bachelor*. Were we to find out that everyone we had thought was a bachelor was actually secretly married, we would not conclude that bachelors were simply different from what we had thought. We would conclude instead that there actually were no bachelors around. We might, of course, under these circumstances start using the term *bachelor* to mean 'secretly marriend man', but this would constitute a change in meaning of the word *bachelor*.

been noted by Kaplan (1973, n.31), Donnellan (1973), and Salmon (1981), it is not clear that the concept carries over from proper names to NKTs straightforwardly in the desired way. If *rigid designator* is taken to mean 'having the same extension in all possible worlds', and if common nouns (including NKTs like *tiger* and *gold*) are assigned extensions in the usual way, then almost no common nouns will be rigid designators. This is because the set of tigers, or the amount of gold, just like the set of bachelors, will certainly vary from possible world to possible world, just as it does across times here in the actual world. (One might devise a new semantic relation, call it *designation*, which holds between common nouns and kinds, the latter viewed as abstract Platonic universals; and redefine *rigid designation* as 'having the same designation in all possible worlds'. Then all NKTs will be rigid designators, but so will common nouns like *bachelor*, as well as common noun phrases like *inventor of bifocals*, and *small yellow coffeepot with a chipped top and a frayed cord*.[4] Clearly if nondescriptionality, as a property of common nouns (and possibly adjectives and verbs), is what we are interested in then the property of rigid designation is not going to be of immediate help.

It may be useful, at this point, to review Putnam's views on natural kind terms, which were developed at roughly the same time as Kripke's, and which both acknowledge to be similar in spirit. Putnam is most famous in this context, perhaps, for his 'twin earth' thought experiments, designed not only to make a point similar to what I am calling Kripke's metaphysical claim, but also to establish a more striking conclusion. We are to imagine a world just like ours with the exception that that clear, colorless liquid which falls from the sky as rain and fills the lakes and rivers (and which twin earthians call *water*) is not H_2O, but has instead some complex molecular structure which Putnam abbreviates XYZ. Is this stuff water? It is not. (This is the metaphysical claim.) Now roll back the time to 1750, when no one on earth or twin earth knew what the internal structure of rain was. $Oscar_1$ on earth and $Oscar_2$, his doppelganger on twin earth, can now be imagined to be of entirely like minds about everything, including that which they call *water*, down to the last synapse. The striking conclusion? If meaning is what determines reference, then (in Putnam's words) "'meanings' just ain't in the head" (227).

This last conclusion of Putnam's deserves more discussion than I can give it here, but a few remarks may be in order. First, it should be noted that if *meaning* is defined as that

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[4]See Salmon (1981, ch. 2) for illuminating discussion of this issue. Note that this relation of designation is not entirely hokey. It does make some sense to say that *bachelor* refers to the same thing in all possible worlds--namely bachelors.

which determines reference, then if one accepts and agrees with Putnam's thought experiments one would seem to have to accept his conclusion.[5] However one consequence of Kripke's views is that the reference determining properties associated with NKTs should <u>not</u> be considered to be (a part of) their meaning, that NKTs don't have a meaning in the sense of a Fregean sense. This is in fact just what I have labelled Kripke's epistemic claim above. What makes the situation puzzling is that Putnam voices agreement with Kripke's views, and even carries out thought experiments similar to Kripke's on this point (i.e imagining situations in which we find we have been wrong about the internal structure properties of some natural kind), and apparently shares Kripke's intuitions about the results of such experiments. One way of resolving the puzzle is to take seriously the scare quotes around *meaning* in Putnam's famous dictum, but I'm not sure this would be satisfactory. Fortunately, for the purposes of the present paper it should be possible by and large to ignore this matter in what follows.

The major issue which I want to consider in this paper is the following: just what sorts of general terms in a language are nondescriptional (in Salmon's sense)? That is, what kinds of expressions other than proper names lack a Fregean sense, are not linked to their extension in virtue of properties semantically associated with the term? (Or, to put it in more neutral terms, what kinds of expressions behave semantically like *tiger* and *gold* rather than like *bachelor*?) A related question which also needs an answer is, why do these terms and not others behave in this way? In addressing these questions I want to sort out a variety of factors which, in the relevant literature on this subject, have become intertwined in a confused way. (The concept of rigid designation, discussed briefly above, is one example.)

The phrase *natural kind term* is in common use now in the literature as a name for this class of expressions, but in at least one respect it appears not to be the most apt. That is because there are descriptional terms which denote things existing in nature--things, that is, whose existence is not dependent on human intelligence. Words like *child, mare,* and *planet* are examples. In each of these cases the extension determining properties seem to be semantically associated with the word. Furthermore these properties are not, or at least not entirely, of the 'internal structure' type. Thus they

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[5]The *seem* here needs stress. Actually, it might be possible to maintain the reference-determining sense of *meaning,* accept and agree with Putnam's experiments, and deny the conclusion. There isn't space here to go into this possibility, but cf. the remarks in Fodor (1981).

I should also take this opportunity to note that I'm not the only person who has found Putnam's use of the word *meaning* puzzling. See Green (1983).

were not discovered by science long after the word had been in use, but instead are based on ordinary perceptions. Another possibly relevant fact is that these words do not name essential properties of the objects which fall in their extension. Were Mercury, for example, to be thrown out of its orbit by some cosmic catastrophe and sent hurtling aimlessly through space it would still be Mercury while ceasing to be a planet. (We might still continue to call it *the planet Mercury*, but *planet* in this title would be honorary and hollow, like *empire* in *The Holy Roman Empire*; and there would be no contradiction in asserting, sadly, "The planet Mercury is no longer a planet".) I will return below to the relation of essential properties to the topic at hand.

We need to clarify right away what the tests are for nondescriptionality. Both of Kripke's thought experiment types play a role. The metaphysical, alternative possible worlds imaginings (like Putnam's twin earth situations) tell us what the criteria for reference are, while the epistemic considerations--what could we find out we were wrong about?--tell us when those criteria are not semantically associated with the term in question. Armed with these tests, let us move on to consider the possibility that there are nondescriptional terms which do not denote natural kinds.

The obvious category to look at first is artifact terms, words like *pencil*, *chair*, and *telephone*. Putnam makes it clear that he believes this group belongs in the category of words he is talking about--those whose meanings, or 'meanings' (according to him) "just ain't in the head". In fact he says "most terms are *rigid*" (265). There are a couple of problems here. One is that, as we have seen, it's not clear that rigid designation is a concept that applies usefully to general terms. The other is that, given Putnam's remarks on meaning, or 'meaning', it's not clear that he takes nondescriptionality to be a feature of this class of words. Ignoring these details, let us consider his discussion of pencils, an example he attributes to Rogers Albritton. On the one hand, we are to imagine discovering that pencils are organisms. (This is the epistemic experiment.) "We cut them open and examine them under the electron microscope, and we see the almost invisible tracery of nerves and other organs" (242). Still, we describe the situation that way (i.e. "Pencils are organisms"), rather than concluding that there are no such things as pencils. On the other hand (the metaphysical experiment), assuming that pencils <u>are</u> made by humans of wood and graphite as we believe them to be, but on twin earth there exist the pencil-like organisms described, in this situation, according to Putnam, we would <u>not</u> say "Some pencils are organisms", but rather that the things on twin earth that look like pencils actually aren't.

I find several problems with this discussion of Putnam's. Let us first consider his second experiment, the metaphysical one. Logically, this test comes prior to the epistemic one

since it is aimed at determining criteria for reference--what would constitute meaning for a descriptional term. Here my intuitions differ from Putnam's. That is, it seems to me that in the twin earth case these organisms would be pencils, as long as people used them the way we use our pencils. It seems to me that this would be true even if the twin earthlings didn't call them *pencils* but, say, *quaxels*, and even if they didn't look exactly like our pencils. This is, admittedly, a weak response, but it should be noted that Putnam himself admits that the *pencil* case is less clear than the cases with obvious natural kind terms.

Another point to be made is that there are other logically possible reference-determining criteria for the term *pencil*. Putnam only considers 'internal structure', which Kripke argued to be crucial for natural natural kinds; but in the case of artifacts we might well suppose that external, observable properties such as general appearance and/or function would be more to the point. (This should be especially obvious in the current plastic age.) Let us consider some further twin earth situations to test these other possibilities. First, testing for shape, consider some twin earth implements (called by them "quaxels") which have a core of graphite encased in wood but which are always black or dark purple, bulbous, and decked out in frilly material. It seems to me that as long as they use them to write the way we use pencils, those objects would be pencils. On the other hand let us suppose objects which look exactly like our yellow Eberhard number 2s, but which are never used to write with. Suppose instead that they are regularly sold in stores as food, and eaten--for roughage and to strengthen the teeth. Are these pencils? My intuitions are not entirely clear on that point. One thing, however, is quite clear. Were we to discover on twin earth black bulbous frilly objects called *quaxels*, which are sold in stores as food and part of every twin earthling's healthy breakfast, these things would definitely not be pencils, regardless of their internal structure. This suggests that perhaps some combination of appearance and function is what makes a pencil a pencil.

Now we are in a better position to move on to the epistemic considerations. Putnam's epistemic experiment shows that internal structure properties are not semantically associated with the word *pencil*, but our metaphysical experiments suggest that those were the wrong properties to consider anyway. What we want to imagine now is not a situation in which we were wrong about the internal structure of pencils, but one in which we have been wrong about their appearance and function. The problem is that this is very difficult to do. An easier thought experiment is to imagine that Eberhard-Faber and its competitors drastically change the shape of their product and discover that by adding powerful flavorings they can increase its marketing potential. (They want to get on the fiber bandwagon.) If they continued to

call these things pencils, then we would too, but it seems to me that under these circumstances, the word *pencil* would have undergone a change in meaning.[6]

Are there any other considerations that can help us get a fix on nondescriptional expressions? One possibility concerns essential properties of objects. Indeed it is sometimes assumed, typically without argument, that natural kind terms are just those which name essential properties of things. (Cf. Keil In press, and Poncinie 1985; scattered remarks in *Naming and necessity* are also relevant here. It may be that when some people talk about natural kind terms being rigid designators, this is what they have in mind.) It is true that the clear examples of nondescriptional natural kind terms (*tiger, gold, water, heat*) do seem to name essential properties of the things they denote, while clearly descriptional terms such as *bachelor* and *planet* do not. Note too that the reference-determining criteria for nondescriptional natural kind terms are internal structure properties. Such would seem to be essential properties of objects if anything is.

Let us assume for the time being that naming an essential property of a thing gives us another test for nondescriptionality. When we apply this test to artifact terms we get results which jibe with our conclusions above--that artifact terms are not nondescriptional. (These results go contrary to the tentative conclusions Kripke reaches in n. 57, p. 115.) Here is one example. There used to be in my family an ingenious type of child's highchair which could be unhooked at the back and folded in the front to form a low child's table with a low child's chair attached to it. It seems to me that, in the latter state, this object was no longer a highchair; while when it was in its highchair mode there was no table to it (the surface which formed the table being, during the highchair mode, face down about 2 inches off the floor). Further examples come from some clever experiments designed by Frank Keil concerning language acquisition. Briefly, small children were shown what were described as 'before' and 'after' pictures. One pair showed a porcupine, and then a cactus, and the children were told that the porcupine had been injected with a strong sleeping potion that made it curl stifly up in a ball and had then been spray-

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[6]This last thought experiment brings up the issue of language change and what, if any, predictions Kripke's views make. To compare the results above on *pencil* with an undisputed nondes-criptional NKT we would need to imagine a situation in which, say, tigers underwent a change in their internal structure. Would we continue to call them tigers? If so, would we feel the word had undergone a change in meaning? At this point I begin to feel that we are treading on not very firm ground, and that the whole issue needs closer examination than it can be given here.

painted green. Then then were asked, concerning the cactus picture, whether this was still a porcupine. A different type of pair showed a coffeepot, and then a bird-feeder, and the children were told a similar story and asked a similar question. After a certain age (generally by the age of 10), children began consistently to respond that what they were told had been a porcupine was still a porcupine, but that what had been a coffeepot was no longer a coffeepot.

Let me try to summarize our conclusions. I think they present a fairly coherent picture, and at the same time suggest an explanation for the phenomenon of nondescriptionality. We find in English (and presumably any natural language) a small group of expressions which refer to species of things found in nature. These species are defined by their internal structure--determined by genetics in the case of living things, and by chemical or physical properties in the case of others. Hence the reference of these terms is determined by such properties. These properties do not, however, constitute the Fregean sense of such terms--that is they are not semantically associated with the terms in question. This is only natural given that the terms themselves were introduced long before science discovered the internal structure properties. John Locke distinguished nominal essences--properties associated with words and which are products of human understanding, from the real essences things possess. However Locke thought that in all cases it was the nominal essence that words signified. One of his arguments was that we don't know the real essences of things. Of course in his day we didn't, and nowadays ordinary speakers typically don't either (although they know that <u>someone</u> knows). What Kripke and Putnam have shown us is that in the case of natural kind terms we nevertheless let nature's essence do the work of a nominal essence (or Fregean sense), and must have done so even in Locke's time and ages before. Frank Keil's results with 10 year olds (who in the relevant respects of knowledge are possibly similar to early language users) show us that, despite Locke's arguments to the contrary, this is a natural human thing to do.

What I have tried to do in this paper is clarify the situation. In so doing, I have argued that contrary to Putnam's and Kripke's remarks, the class of expressions in question is in fact pretty small.[7] A number of issues remain. One is, is the nondescriptionality of those NKTs which <u>are</u> nondescriptional of any significance as far as their functioning in a language goes? Are there any grammatical correlates of nondescriptionality, and if not, why not? Another concerns the relation between descriptionality and decompositionality. Are these the same thing; and if not, how is that possible? Yet another is the learnability question.

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[7]See Green (1983) for an opposing view which is more similar to Putnam's.

If my conclusion about the limitations of the class of nondescriptional NKTs is correct, it substantially reduces the burden on our innate language faculty given a Fodorian picture of what that language faculty must include (i.e., an innate inner language with the same expressive power as any natural language), but it still seems implausible that any of these terms should have innate translations, which leaves the problem of how they are learned. (Cf. Fodor (1975).) I hope a truer picture of the nature of nondescriptional terms will help in the resolution of these issues.

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